

## 가 Capsaicin

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### The Effect of Red Pepper and Capsaicin on Gastric Emptying

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**Background/Aims:** Capsaicin stimulates the release of several neuropeptides and has diverse effects on gastrointestinal function. We investigated the effect of intragastric red pepper or capsaicin on the gastric emptying in human. **Methods:** Fourteen healthy male volunteers were recruited. Gastric emptying was assessed by radio-opaque markers (ROMs) method and plasma acetaminophen (AAP) levels. **Results:** The clearance of ROMs at 2 hours and 3 hours was  $10.6 \pm 15.9$  and  $73.1 \pm 34.6\%$  after administration of placebo,  $17.6 \pm 26.0$  and  $78.7 \pm 40.2\%$  after administration of red pepper 3 g,  $27.8 \pm 34.0$  and  $73.2 \pm 31.9\%$  after administration of red pepper 6 g,  $2.1 \pm 5.1$  and  $15.5 \pm 20.7\%$  after administration of capsaicin 17.3 mg. Capsaicin significantly delayed the gastric emptying of ROMs. The serum AAP concentrations were measured at 30, 45, 60, 75 and 90 min after administration of placebo ( $4.09 \pm 3.45$ ,  $8.09 \pm 4.13$ ,  $13.55 \pm 4.90$ ,  $15.50 \pm 3.44$  and  $13.0 \pm 7.53$   $\mu\text{g/ml}$ ), red pepper 3 g ( $5.63 \pm 4.84$ ,  $8.88 \pm 4.76$ ,  $14.25 \pm 5.01$ ,  $15.11 \pm 5.16$  and  $16.80 \pm 6.57$   $\mu\text{g/ml}$ ), red pepper 6 g ( $7.0 \pm 7.19$ ,  $8.09 \pm 5.63$ ,  $12.09 \pm 6.04$ ,  $13.73 \pm 4.65$  and  $14.28 \pm 3.77$   $\mu\text{g/ml}$ ), capsaicin 17.3 mg ( $4.50 \pm 2.88$ ,  $7.17 \pm 3.19$ ,  $11.50 \pm 4.76$ ,  $11.17 \pm 3.71$  and  $13.33 \pm 3.72$   $\mu\text{g/ml}$ ). Intragastric red pepper or capsaicin made no significant difference of serum acetaminophen level from placebo. **Conclusions:** Intragastric administration of capsaicin delayed gastric emptying of indigestible solid meal, whereas red pepper did not. The gastric emptying of liquid meal was affected by neither capsaicin nor red pepper. (**Ko J Gastroenterol 1999;33:496 - 503**)

**Key Words:** Capsaicin, Red pepper, Gastric emptying

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capsaicin (Sigma Co. St. Rouis. USA) 17.3 mg  
가  
1  
가 (1 2.5-25 g)17  
가 capsaicin  
.1 Capsaicin  
capsaicin (gelatin cap-  
(capsaicin sensitive afferent nerve) sub-  
stance P calcitonin gene-related peptide (CGRP)  
(neuropeptide)  
.23 Substance P CGRP  
1) 가  
가 capsaicin , ,  
.46 capsaicin , , , 가  
,78 9 , , ,  
10-15 11가 가  
가 (0= , 1= :  
, 2= :  
가 .16 , 3= : )  
가 capsaicin  
2)  
(indigestible solid meal)  
가 24  
( : 1 mm, : 4.5 mm)  
(Sitzmarkers<sup>®</sup>, Fortworth, Texas, USA)  
2 3  
1. ,  
29 14 가  
,  
3)  
(liquid meal) 가  
1.5 g 30, 45, 60, 75  
90  
8 400 cc( 220 10 cc EDTA (1.25 mg/ml blood)  
kcal, 14.9 g, 11.2 g, 19.2 g) aprotinin (500 KIU/ml blood)가  
(acetaminophen) Du  
(radio-opaque marker) 3 , Pont Aca IV analyzer (Du Pont, Wilmington, USA)  
가 3 g 가 6 g (enzyme multiplied immu

noassay technique)

가

6 g 4  
capsaicin

4)

±

(repeated two-  
P value가 0.05

capsaicin

1

way ANOVA)

2.

1. 가

2 3

10.6±15.9, 73.1

, 가 3 g, 가 6 g,  
capsaicin 17.3 mg 0.2, 0.2, 1.4, 18.6  
capsaicin 가  
(Fig. 1). , 가 3 g 1

±34.6%, 가 3 g 17.6±26.0, 78.7±  
40.2%, 가 6 g 27.8±34.0, 73.2±  
31.9% capsaicin 17.3 mg 2.1±5.1,  
15.5±20.7% (Table 1). 가

**Fig. 1.** Symptom scores. Capsaicin developed gastrointestinal symptoms significantly compared with placebo, red pepper 3 g or 6 g (\*p<0.05).

**Table 1.** Gastric Emptying Assessed by Radio-opaque Marker (%)

Time (hour)	Placebo	Red pepper 3 g	Red pepper 6 g	Capsaicin
2	10.6 ± 15.9	17.6 ± 26.0	27.8 ± 34.0	2.1 ± 5.1*
3	73.1 ± 34.6	78.7 ± 40.2	73.2 ± 31.9	15.5 ± 20.7*

Capsaicin significantly delayed the gastric emptying of radio-opaque markers compared with placebo or red pepper (\*<0.05).

가 (ablation)

capsaicin, 가 3 g, 가 6 g

(probe) .23

capsaicin .1819

capsaicin capsaicin

. Capsaicin

3.

30, 45, 60, 75, 90

4.09 $\pm$ 3.45,

8.09 $\pm$ 4.13, 13.55 $\pm$ 4.90, 15.50 $\pm$ 3.44, 13.00 $\pm$ 7.53

$\mu$ g/ml, 가 3 g 5.63 $\pm$ 4.84, 8.88

$\pm$ 4.76, 14.25 $\pm$ 5.01, 15.11 $\pm$ 5.16, 16.80 $\pm$ 6.57  $\mu$ g/

ml, 가 6 g 7.00 $\pm$ 7.19, 8.09 $\pm$ 5.63,

12.09 $\pm$ 6.04, 13.73 $\pm$ 4.65, 14.28 $\pm$ 3.77  $\mu$ g/ml

capsaicin 4.50 $\pm$ 2.88, 7.17 $\pm$ 3.19, 11.50 $\pm$

4.76, 11.17 $\pm$ 3.71, 13.33 $\pm$ 3.72  $\mu$ g/ml (Table

2). , 가 capsaicin

가 .

lator) tachykinin (source)

substance P substance P

가, .4

가

capsaicin substance P가

. Capsaicin ,21-23

가 capsaicin

CGRP

,78 9 .24

10-15 CGRP

capsaicin

**Table 2.** Gastric Emptying Assessed by Acetaminophen Level

Time (min)	Placebo	Red pepper 3 g	Red pepper 6 g	Capsaicin	Capsaicin
30	4.09 $\pm$ 3.45	5.63 $\pm$ 4.84	7.00 $\pm$ 7.19	4.50 $\pm$ 2.88	NS
45	8.09 $\pm$ 4.13	8.88 $\pm$ 4.76	8.09 $\pm$ 5.63	7.17 $\pm$ 3.19	NS
60	13.55 $\pm$ 4.90	14.25 $\pm$ 5.01	12.09 $\pm$ 6.04	11.50 $\pm$ 4.76	NS
75	15.50 $\pm$ 3.44	15.11 $\pm$ 5.16	13.73 $\pm$ 4.65	11.17 $\pm$ 3.71	NS
90	13.00 $\pm$ 7.53	16.80 $\pm$ 6.57	14.28 $\pm$ 3.77	13.33 $\pm$ 3.72	NS

NS, not significant; Intra-gastric red pepper or capsaicin made no significant difference of serum acetaminophen level from placebo.

- .25 , (interdigestive migrating motor complex, MMC) -CGRP -CGRP가 cAMP .34 .26 capsaicin phase III substance P가 , MMC CGRP가 , capsaicin 가 capsaicin , , prostaglandins가 .35,36 .27 (in vitro) capsaicin substance P .21-23 .37 capsaicin - 120 .28 가 capsaicin , 120 가 가 - 가 가 .38 capsaicin 가 .16 3 g, 6 g 가 6 g (high performance liquid chromatography) 29,30 capsaicin 17.3 mg , , 가 3 g, 6 g , 가 , capsaicin . Capsaicin 가 2 2 3 , 가 3 가 가 . g, 가 6 g 가 8 7 capsaicin , 가 .16 가 capsaicin capsaicin . 가 .28 .31,32 가 33 .

가 capsaicin saicin 17.3 mg 18.6 capsaicin  
가 . 30, 45, 60, 75, 90  
가 가 4.09  
capsaicin 가  
6 g 가  
capsaicin 6 g 가  
mg capsaicin 17.3  
가 6 g  
capsaicin 4.50 $\pm$ 2.88, 7.17 $\pm$ 3.19, 11.50  
4.76, 11.17 $\pm$ 3.71, 13.33 $\pm$ 3.72  $\mu$ g/m  
가 2 3  
substance P CGRP  
가  
MMC  
, capsaicin  
24 capsaicin  
가  
가  
10.6 $\pm$ 15.9, 73.1 $\pm$ 34.6%, 가 3 g  
17.6 $\pm$ 26.0, 78.7 $\pm$ 40.2%, 가 6 g  
27.8 $\pm$ 34.0, 73.2 $\pm$ 31.9% capsaicin 17.3 mg  
2.1 $\pm$ 5.1, 15.5 $\pm$ 20.7% . 가  
capsaicin , 가 3 g, 가 6 g  
(p<0.05). : 가  
, capsaicin , capsaicin

: Capsaicin, 가 ,

: Capsaicin 가  
substance P  
calcitonin gene-related peptide  
가 capcaicin  
29  
14  
가 capsaicin  
가  
0.2, 가 3 g 0.2, 가 6 g 1.4, cap

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